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SURVEY OF SHRIMP POTENTIAL IN SOUTHERN BRAZIL, 1961 1/

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Table of Contents

Subject	Page
Table of Contents	1
Summary and Conclusions	2
Shrimp Production	3
Areas of Production	5
Availability	6
Species Composition, Coloration & Sizes	10
Prices and Market	11
Fishing Craft and Facilities	11
Ice and Freezing Facilities	12
Ice and Freezing Equipment Costs	13
Transportation	13
Brazilian Capital	14
Labor	14
Laws and Taxes	14

BUREAU OF COMMERCIAL FISHERIES
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Summary and Conclusions

The coastal area of southern Brazil, inhabited by shallow-water forms of shrimp, has been fished for a number of years and is being fished at the present time.

In this area the shrimp nursery grounds are rather widely separated, relatively limited in extent and fed by a very narrow freshwater drainage-belt. In most of the area the drainage belt is practically on the coast. The Paraná and Uruguay Rivers receive almost all of the drainage of southern Brazil. Nutrients from the land, consequently, are limited on the nursery grounds.

The São Paulo, Paraná and Santa Catarina nursery grounds appear to be more suited for seabobs.

The sub-adults of all species are heavily fished on the nursery grounds and there is little likelihood of any change in this in the forseeable future.

The medium and large Santos trawlers and the Japanese trawlers (because of the price) search mainly for shrimp, but none of these boats exists solely on shrimp. Fish are also an important and necessary part of their catch.

The medium and large Brazilian trawlers, although undoubtedly not as efficient shrimpers as modern U.S. double-rigged boats, are still fairly efficient rigs. They certainly are as efficient as and probably more efficient than Mexican trawlers of 15 years ago. Richardson and Moraes, in the best 60-mile-square area where a reasonable amount of fishing was done, show the average catch of pink shrimp to have been but about 23 pounds (headless weight) per hour. Probably less than 50 boats fished this area periodically when shrimp were most abundant. This does not compare with the Mexican catch (15 years ago in a good area) of about 83 pounds per hour.

The Japanese have already had a large research boat explore the Brazilian coast. This boat was equipped for long-line operations and for bottom trawling. As a result the bulk of the Japanese operations in Brazil are now centered about Recife and Santos for long-lining tuna and Santos for trawling for fish and shrimp and purse-seining (quite recently) for sardines. The Taiyo trawling operations out of Santos are principally for fish and shrimp for local consumption in Brazil.

The local market and demand for shrimp are good. 15 count and under shrimp on the Santos and Rio de Janeiro markets were retailing (on an equivalent headless-price basis) for between 70 cents and $1.00 U.S. per pound.

The large Brazilian trawlers, mostly out of Rio Grande, work off Uruguay and Argentina seeking fish for the Brazilian markets.

Because of the above and what follows the writer is of the opinion that:

1.- The shrimp fishing grounds along the coast of southern Brazil are neither virgin nor unexplored and they are limited in production.

2.- Fishing only for large shrimp for export in this area does not appear very promising. A combined operation including the accompanying fish catch should also be considered.

3.- Any serious U.S. endeavor should entail exploratory fishing with the most modern gear in advance of investment in shore plants.

4.- Experimental fishing should not be limited to modern shrimp-trawling techniques. The experimental boat should also be equipped to use high-mouthed trawls and, in particular, mid-water trawls. It should have the most modern electronic devices for locating fish and for adjusting mid-water trawls.

Shrimp Production

In 1959 Brazil produced an estimated 18,138 metric tons, heads-on weight, of shrimp. Officials in the Brazilian Ministry of Agriculture believe this to be a minimum estimate. Heaviest production came from the State of Santa Catarina in the south with 6,030 tons and Maranhão in the north with 5,745 tons. The bulk of the landings in these two states were seabob (sete barba) Xiphopeneus.

About 65 per cent of the landings were in the area from Rio de Janeiro to Rio Grande do Sul.

TABLE 1

ESTIMATED SHRIMP PRODUCTION, BRAZIL, 1959. IN METRIC TONS, HEADS-ON WEIGHT.

STATE	METRIC TONS
Pará	140
Maranhão	5,745
Piaui	4
Rio Grande do Norte	162
Paraíba	63
Pernambuco	26
Alagoas	36
Sergipe	40
Bahia	258
Espírito Santo	75
Rio de Janeiro	1,698
Distrito Federal	969
Sao Paulo	1,880
Paraná	422
Santa Catarina	6,030
Rio Grande do Sul	590
Total	18,138

Source: Pesca-1959. Ministerio da Agricultura, Servicio de Estatística da Produção; March 1961.

Landing records, with the exception of those for the Port of Santos, are not particularly good. In Santos, however, since July 1958 excellent records have been maintained on the operations of the Santos fleet. 1/

At Santos annual shrimp landings run between about 1,200 and 1,500 metric tons. Shrimp landings in Rio Grande in 1959 of about 600 tons was considerably below the

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1/ These records are based on log books and interviews. The Instituto Oceanográfico of the Universidade de São Paulo and the Departmento de Caça e Pesca of São Paulo have united in a joint program of gathering and analysing these data. The first publication "A first appraisal of the landing and mechanism of the Santos fishery" by I.D. Richardson and M.N. Moraes (Boletim do Instituto Oceanográfico, Tomo XI, Fasc. 1, Pags. 5 a 86, Universidade de São Paulo, 1960) contains some very useful information. This publication has been drawn on heavily for the present report.

The data in this publication do not include the catches of tha Taiyo trawl fleet operating out of Santos.

2000 ton average for 1953-55 period.

Areas of Production

By far the greatest production of shrimp in southern Brazil comes from the lagoons, estuaries and beaches where they are taken by fishermen, from dugouts, with cast nets and beach seines. The lagoons of Santa Catarina yield most of the production. The catch of the Santos fleet, a discussion of which follows, is not particularly large.

The Santos fleet fishes the coast from about Latitude 23°S to at least 33°S. The most heavily fished area is that just south of Santos. From July 1938 through June 1939 the Santos fleet spent 161,000 hours fishing and about 63 per cent of this was between Latitudes 24°00'00'' and 24°59'59''S.

Only the medium and large otter trawlers and parejas (two boats towing a net like a paranzella between them) fish the entire southern coast. The small parejas and otter trawlers do not go far from Santos. Table 2 shows the fishing time by type of gear for each degree of latitude.

TABLE 2

FISHING TIME BY DEGREES S. LATITUDE OF SANTOS FLEET.
IN 1000 HOURS.

TYPE OF GEAR	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	TOTAL
Pareja Med. & Large	2.2	17.8	18.5	1.9	3.0	0.5	2.0	2.1	0.2	0.0	48.2
Otter trawl Med. & Large	5.4	43.1	1.9	2.0	15.4	0.6	0.4	0.1	0.2	0.5	69.6
Pareja Small	2.5	30.7	0.6	-	-	-	-	-	-	-	33.8
Otter trawl Small	0.3	9.1	-	-	-	-	-	-	-	-	9.4
Total	10.4	100.7	21.0	3.9	18.4	1.1	2.4	2.2	0.4	0.5	161.0

Source: Adapted from Richardson and Moraes Figure 2.

Note: Small boats are less than 10 meters in length, medium are between 10 and 20 meters and large are over 20 meters.

In the period between July 1958 and June 1959 about 57 per cent of the pink, 50 per cent of the white and 94 per cent of the seabobs were taken in the area encompased by 24°S Lat. Most of the seabobs are taken quite close to the beach, the whites a bit offshore and the pinks between 20 and 30 fathoms. The best pink fishing grounds are between Alcatras Island and the Rochedos and near Santa Catarina Island.

TABLE 3

SHRIMP CATCH SANTOS FLEET BY DEGREES S. LATITUDE. IN METRIC TONS; HEADS-ON. JULY 1958-JUNE 1959.

TYPE	23°	24°	25°	26°	27°	28°	29°	30°	31°	32°	TOTAL
Pink	71.6	372.2	16.7	13.0	169.0	5.9	2.3	0.9	-	0.4	652.0
White	1.9	25.2	21.1	1.2	0.8	0.8	-	-	-	-	51.0
Seabob	30.3	502.8	2.4	-	-	-	-	-	-	-	535.5
Total	103.8	900.2	40.2	14.2	169.8	6.7	2.3	0.9	-	0.4	1,238.5
Percent	8.4	72.7	3.2	1.1	13.7	0.6	0.2	0.1	-	0.0	100.0

Source: Adapted from Richardson and Moraes Fig. 1, e, f and g.

Availability

Practically all of the pink shrimp are taken by the medium and large trawlers, most of the whites by medium and large parejas and almost all of the seabobs by the small parejas and trawlers. This indicates to the reporting officer that the small boats operate close to shore, the medium and large trawlers fairly well off shore and the medium and large parejas in between.

TABLE 4

SANTOS FLEET SHRIMP LANDINGS BY GEAR IN METRIC TONS. JULY 1958-JUNE 1959

TYPE	PAREJA SMALL	PAREJA MED. & LARGE	TRAWL SMALL	TRAWL MED. & LARGE
Pink	3.0	14.8	0.8	633.4
White	9.8	39.3	0.3	0.9
Seabob	351.5	5.6	171.9	6.4

Note: Small boats are under 10 meters in length, medium boats are between 10 and 20 meters and large are over 20 meters.

Source: Richardson and Moraes, Tables IV-E, F and G.

When the average landing per hour of fishing is considered it is apparent that the medium and large trawlers are principally after pink shrimp, the small trawlers and parejas for seabobs and the medium and large parejas are interested mostly in fish.

TABLE 5

AVERAGE LANDING OF SHRIMP PER HOUR OF FISHING. SANTOS, BRAZIL, JULY 1958 - JUNE 1959. IN POUNDS PER HOUR, HEADS-OFF WEIGHT

GEAR	PINK	SEABOB	WHITE
Otter trawl Medium and Large	10.9	0.1	0.0
Otter trawl Small	0.1	24.0	0.0
Pareja Medium and Large	0.4	0.1	1.0
Pareja Small	0.1	13.6	0.4

Source: Converted from Table III. Richardson and Moraes.

Conversion factor used: 1.309 times heads-on weight in kilograms equals heads-off weight in pounds.

During the period July 1958-June 1959 the medium and large trawlers averaged about 11 pounds of shrimp per hour (heads-off weight) of which about 10.9 were pinks. The small trawlers averaged about 24 pounds and the small parejas about 13.6 pounds of seabobs per hour each.

When only the medium and large trawlers are considered and the area broken down into three regions (see note at end of Table 6 for Regions) the central and northern regions, with 12.8 and 11.8 pounds per hour of pink shrimp respectively, evidently have the better shrimping grounds. Probably colder waters to the south induce the pink shrimp to move northward.

TABLE 6

TOTAL WEIGHT LANDED (JULY 1958 - JUNE 1959), NUMBER HOURS FISHING AND LANDING PER HOUR IN POUNDS, HEADS-OFF WEIGHT.

REGIONS	TRAWLS - MEDIUM AND LARGE		
	1000 lbs.	1000 hours	lbs. per hour
PINK SHRIMP			
Northern	569.2	48.6	11.8
Central	256.5	19.9	12.8
Southern	3.4	1.1	3.0
SEABOBS			
Northern	8.4	48.6	0.2
Central	0.0	19.9	0.0
Southern	0.0	1.1	0.0
WHITE SHRIMP			
Northern	0.9	48.6	0.0
Central	0.3	19.9	0.0
Southern	0.0	1.1	0.0

Source: Converted from Richardson and Moraes Tables IV-E, IV-F, IV-G.

Note.- Northern Region extends from Lat. 23°00'01''S to Lat. 25°00'00''S; Central Region from Lat. 25°00'01''S to Long. 49°00'00''W and Lat. 30°00'00''S; and Southern Region from Long. 49°00'01''W and Lat. 29°00'01''S to Lat. 33°00'00''S.

With data for only one year it is difficult to draw conclusions regarding intra-seasonal variations in availability. In the period under consideration the white shrimp production shows two modes - one in October and a much larger one from April through June. Comparing these with the runs of Louisiana whites they seem to fit very well. The October run in Brazil would compare with the Spring run in Louisiana and the April to June run with the Louisiana Fall run.

The seabob appear to have a peak between May and July. The pink shrimp production declined rather steadily from a high of about 110 tons in July 1958 to 11 tons in June of 1959. There are two species of shrimp that are included in the pink records. Until separate data are available on each species it is futile to speculate on their relative availability.

TABLE 7

SHRIMP LANDINGS SANTOS, BRAZIL, JULY 1958 THROUGH JUNE 1959. IN METRIC TONS, HEADS ON

MONTH	WHITE	SEABOB	PINK	TOTAL
July 1958	-	62.9	109.5	172.4
Aug. "	-	43.0	70.4	113.4
Sept. "	0.9	42.3	59.0	102.2
Oct. "	4.5	36.1	70.8	111.4
Nov. "	1.8	55.1	60.4	117.3
Dec. "	1.0	42.8	65.5	109.3
Jan. 1959	0.7	42.9	48.3	91.9
Feb. "	1.1	9.4	43.8	54.3
Mar. "	4.7	32.3	47.6	84.6
Apr. "	11.9	44.6	41.3	97.8
May "	11.7	57.0	24.4	93.1
June "	12.7	67.1	11.0	90.8
Total	51.0	535.5	652.0	1,238.5

Source: Richardson and Moraes pp. 8 and 9.

Enclosure 1 gives for each month and region the total catch and the catch per hour for medium and large trawlers and parejas. The best catches per hour of pink shrimp in the southern region were in July with 18.5 pounds and in the northern and central regions October with 18.2 and 20.8 respectively.

Species, Composition, Coloration and Sizes.

Although highly variable the landings of the Santos fleet appear to run about 5 per cent white and about 45 per cent each of pink and seabobs.

TABLE 8

SHRIMP LANDINGS, SANTOS, BRAZIL. IN METRIC TONS HEADS-ON WEIGHT.

TYPE	CALENDAR 1960	PER CENT	JULY 1958-JUNE 1959	PERCENT
White	97.8	6.6	51.0	4.1
Pink	468.3	31.4	652.0	52.7
Seabob	925.8	62.0	535.5	43.2
Total	1,491.9	100.0	1,238.5	100.0

Source: Da Divisão de Caça e Pesca do Departamento da Produção Animal. Santos.

The white shrimp (Burkenroad's classification) are Penaeus schmitti and the seabob are Xiphopeneus kroyeri. Richardson and Moraes say the pink shrimp is Penaeus brasiliensis. The writer, however, identified several samples of shrimp from the Santos Market and found that during about mid-August 1961 most of the pink shrimp were P. aztecus. He saw very few P. brasiliensis.

In southern Brazil the adults of both species of pink shrimp are somewhat mottled. P. brasiliensis tends to be somewhat more mottled than P. aztecus.

The white shrimp and the seabob are similar in coloration to the comparable forms in the United States.

Sub-adult P. brasiliensis from the lagoons are rather darkish grey in color.

Data on size distributions were not available but the writer, on various trips to the Santos, São Paulo and Rio de Janeiro markets during the past 10 years, has invariably encountered mostly 20 count and under (on a headless basis) trawl-caught pinks.

He estimates that the trawl-caught pinks average 80 per cent under 15 count headless.

The shrimp in these markets are always sold with the heads on which is a matter of consumer preference - not without reason, since one of the earliest signs of the onset of decomposition in shrimp is the separation of the head from the tail.

The fishermen reported that, like in the United States, the white shrimp were taken mostly during daylight and the pink at night.

Prices and Market

Shrimp prices in Brazil, particularly for the larger sizes, are considerably higher than for most other seafoods. As mentioned before, the shrimp are sold with the heads on. Richardson and Moraes give for Santos an average price per kilo retail for the July 1958-June 1959 period of 300 cruzeiros for pink shrimp, 250 for white and 70 for seabobs. (Fish prices for the same period ran from 20 cruzeiros for the cheapest to 60 for the highest priced).

These prices were not greatly different from those encountered in Santos in August 1961. Pink shrimp, judged to be 15 and under count if headless, were retailing heads-on for between 230 and 300 cruzeiros a kilo (depending upon freshness) and seabobs were 70. No whites were seen. In Rio de Janeiro the prices were comparable but some beautiful specimens of under 10 white shrimp were found in one stall for 330 cruzeiros.

These heads-on prices, at an exchange rate of 250 cruzeiros for $1.00 U.S. would be equivalent to a headless price per pound of about:

a.- 21 cents for seabobs.

b.- 70 cents to $1.00 for large pinks and whites.

Ex-vessel prices were reported to be about 60 per cent of the retail prices.

The local market appears to be quite able to absorb current production at these prices. As transportation and preservation facilities increase the Brazilian market undoubtedly will be able to consume considerably larger quantities of shrimp. Exports this year through June to the United States of only 40,000 pounds indicate that there is presently little surplus.

Fishing Craft and Facilities

In southern Brazil the only sea-going shrimp boats are based at Santos and Rio de Janeiro. As stated previously, these boats do not fish exclusively for shrimp. Shrimp, because of the price, are preferred and the boats maintain

radio communication to run to where shrimping is best, but they must augment their shrimp catches with fish.

Santos fishing craft are classified as small (under 10 meters in length), medium (10 to 20 meters) and large (over 20 meters). Only four types of gear are used: Otter trawls, pareja, purse seines and set lines. At the end of 1960 the boats using these gear out of Santos were:

	SMALL	MEDIUM	LARGE
Otter trawl	40	33	5
Pareja	40	58	6
Purse seine	3	42	-
Line	6	1	3

Since the parejas fish in pairs the amount of gear in operation would be one-half the number of boats.

The Japanese craft at Santos are not included in these figures. Various estimates place the number of trawlers between 6 and 8 with an unknown number of long-liners. One Taiyo representative said they had 9 boats and another 18. Two trawlers seen in port were judged to be about 80 feet in length. The trawl gear was not on deck.

Good dockage facilities appeared to be available for fishing boats at Santos, Paranaguá, São Francisco do Sul, Itajai, Florianopolis, Laguna and Rio Grande. Probably, in most instances, a new enterprise would have to make its own local docking installations. Taiyo has had to make its own docking arrangements at Santos because the local fishermen would not permit unloading at the Entreposto.

Other than at Santos, and perhaps Rio Grande, there does not seem to be any repair facilities capable of handling a fishing boat over about 30 or 40 feet in length.

Ice and Freezing Facilities

Other than in Santos and Rio Grande there is a definite lack of freezing, ice and storage facilities. The Taiyo in Santos and the Renner in Rio Grande are the only plants with modern freezing and storage equipment. The Taiyo plant has two Atlas compression-plate freezers and a small automatic brine-freezing tank. Three frozen storage rooms were in operation and construction was in progress on a fourth.

The Renner plant has two Atlas and one Amerio compression-plate freezers.

The Santos Entreposto has a daily ice capacity of 100 metric tons and storage facilities for 450 tons of iced fish. The State of São Paulo is reported to be installing small ice and fish storage plants in Ubatuba, São Sebastião and Ilhabela.

In Paranaguá the state government has a small plant capable of producing 18 tons of ice a day with storage for 50 tons. There is also a small frozen-storage space that can be kept at 10°C.

In all probability any new venture would require complete facilities and if installed other than in Santos generating and/or standby generating equipment would be necessary.

Fresh water facilities appeared adequate in most places.

Ice & Freezing Equipment Costs

Equipment costs only (not including building and installation costs) for a plant capable of:

1.- Freezing 10 tons of shrimp daily;

2.- Storing 500 tons of frozen products;

3.- Storing 40 tons of iced products;

4.- Producing 20 tons of block ice daily;

5.- And storing 300 tons of ice;

are estimated to be between 20,480,000 and 23,680,000 cruzeiros. The lower estimate would apply if that portion of the equipment required to be imported could be entered duty free. In dollars the equipment for such a plant would cost between about $82,000 and $95,000. These figures do not include standby equipment.

Transportation

The only facilities for local transport of frozen products appear to be by air and by refrigerated truck where land communications are available. For frozen transport to the United States the Moore-McCormack Line has boats that call regularly at such ports as Rio Grande, Paranaguá and Santos. Transportation charges on frozen seafoods from any Brazilian port between São Luiz, Maranhão and Rio Grande, Rio Grande do Sul and any U.S. port on the Atlantic were reported to be $0.05 U.S. per pound for shrimp, $0.045 for unspecified fish and $0.055 for lobsters. These charges are applied to the gross weight of the shipment.

Brazilian Capital

From all indications Brazilian capital appeared to be available for a joint enterprise, provided it could be demonstrated by experimental fishing that a project could be successful.

Labor

Skilled fishermen are available in Rio de Janeiro and Santos but they would have to be trained if equipment, different from that to which they are accustomed, were used.

Workers in shore plants are not accustomed to freezing operations. Principal shore operations are cleaning and salting fish. Plenty of labor, requiring training, appeared to be available.

There evidently is a dearth of net makers. Apparently only the Japanese have good net men. At the Oceanographic Institute in Sao Paulo the writer was informed that the Institute could not find any local person who could cut and put a net together even though illustrations and designs were provided.

In the shore plants it was reported that the workers were paid the equivalent of between about $35.00 and $60.00 U.S. a month.

Laws and Taxes

On June 28, 1961 Decree No. 50872 creating a Council for the Development of Fishing (CODEPE) was published in the Diario Oficial. This decree, for all practical purposes, gave the executive director of CODEPE ministerial rank. The Council was just getting organized to function when President Quadros resigned, consequently there is not much point in disucssing it here. It appeared, however, that an endeavor would have been made to induce foreign capital to aid in the development of Brazilian fisheries.

Past policy, until the Japanese were able to break through in 1957 by special Presidential permit, was to discourage foreigners from fishing. Before this only Brazilians could fish and conduct fishery enterprises (Articles 5 and 38, Código de Pesca).

Another regulations (Article 15, Paragraph d) prohibits trawling within three miles of the coast. It is apparent, from the Santos shrimp landings, that this is not enforced for the Santos fleet.

Union regulations require fishing boats to have a certain complement. According to the Director of Fisheries the usual crew aboard a Brazilian trawler was nine.

It was reported that an export license was required for shrimp but no export taxes were applicable. Port charges are levied and these, reportedly small, vary with each port. Apparently local governments, if interested in an enterprise, can permit exemptions to port charges and various other local taxes.

TOTAL SHRIMP LANDING AND LANDING PER HOUR-FISHING BY REGION, MONTH AND GEAR. IN XXXXXXXXXX HEADS-OFF WEIGHT. SANTOS FLEET, JULY 1958 - JUNE 1959.

MONTH & REGION	PINK				SEABOB				WHITE			
	Trawl Medium & Large		Pareja Med. & Large		Trawl Med. & Large		Pareja Med. & Large		Trawl.Med. & Large		Pareja Med.&Large	
	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour
JULY 1958												
Northern	97.6	16.6	1.5	1.3	0.0	0.0	0.8	0.7	0.0	0.0	0.0	0.0
Central	38.3	15.7	2.9	1.4	0.0	0.0	0.9	0.5	0.0	0.0	0.0	0.0
Southern	2.2	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AUG. 1958												
Northern	67.7	11.7	1.9	1.3	1.4	0.3	0.4	0.3	0.0	0.0	0.0	0.0
Central	17.9	11.0	3.7	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern	- 1/	-	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0
SEPT. 1958												
Northern	65.7	17.8	0.3	0.1	0.0	0.0	1.2	0.8	0.0	0.0	0.4	0.3
Central	9.9	12.4	1.0	0.7	0.0	0.0	1.3	0.9	0.0	0.0	0.3	0.1
Southern	-	-	0.3	0.9	-	-	0.0	0.0	-	-	0.0	0.0
OCT. 1958												
Northern	56.7	18.2	1.3	0.4	0.5	0.1	1.1	0.4	1.6	0.5	2.5	0.8
Central	33.5	20.8	0.6	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.3
Southern	-	-	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0
NOV. 1958												
Northern	13.3	11.8	0.7	0.4	1.4	1.3	0.8	0.4	0.0	0.0	1.5	0.9
Central	63.6	14.4	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Southern	0.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DEC. 1958												
Northern	34.2	9.9	0.5	0.3	1.4	0.4	0.5	0.3	0.1	0.0	0.1	0.0
Central	48.6	12.0	2.0	0.8	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.3
Southern	0.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JAN. 1959												
Northern	43.2	12.3	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Central	17.8	12.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3
Southern	-	-	1.4	5.8	-	-	0.0	0.0	-	-	-	-
FEB. 1959												
Northern	36.6	12.8	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Central	20.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.7
Southern	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
MAR. 1959												
Northern	58.4	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Central	2.2	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

TOTAL SHRIMP LANDING AND LANDING PER HOUR-FISHING BY REGION, MONTH AND GEAR. IN HEADS-OFF WEIGHT. SANTOS FLEET, JULY 1958 - JUNE 1959 (CONT'D.)

MONTH & REGION	PINK				SEABOB				WHITE			
	Trawl Medium & Large		Pareja Med. & Large		Trawl Med. & Large		Pareja Med. & Large		Trawl Med. & Large		Pareja Med.&Large	
	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour	1000 lbs.	lbs. per hour
APR. 1959												
Northern	51.6	8.4	0.0	0.0	3.6	0.5	0.0	0.0	0.1	0.0	5.6	2.4
Central	2.5	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	2.5
Southern	-	-	0.0	0.0	-	-	0.0	0.0	-	-	0.0	0.0
MAY 1959												
Northern	31.7	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	4.5	3.4
Central	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	4.0
Southern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JUNE 1959												
Northern	12.5	6.5	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	5.4	1.7
Central	1.8	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	3.0
Southern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1/ Indicates no fishing in the region during the month.

Source: Converted from Richardson & Moraes Table V-B.

Conversion factor: 1.309 X weight in kilograms heads-on equals headless weight in pounds.

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